

CLAIMS

1. A method of storing and commands, comprising:
recording a first set of commands to a command queue to provide a first dynamic snapshot, wherein the first dynamic snapshot corresponds to a set of commands associated with a first system state;
5 storing the first dynamic snapshot at a first time;
recording one or more additional sets of commands to the command queue;
storing the one or more additional sets of commands, wherein storing a first one of the one or more additional sets of commands is spaced in time from storing a second one of the one or more additional sets of commands by a first storage interval;
10 eliminating selected ones of overriding redundant, and superfluous commands from the command queue to provide a second dynamic snapshot, wherein the second dynamic snapshot corresponds to a set of commands associated with a second system state; and
storing the second dynamic snapshot at a second time, wherein a difference between the first time and the second time corresponds to a second storage interval.
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2. The method of claim 1, wherein the first storage interval is less than one second.
3. The method of Claim 1, wherein the first storage interval is less than five seconds.
- 20 4. The method of Claim 1, wherein the first storage interval is less than sixty seconds.
5. The method of Claim 1, wherein the second storage interval is greater than sixty seconds.
- 25 6. The method of Claim 1, wherein the second storage interval is greater than five minutes.
7. The method of Claim 1, wherein the second storage interval is greater than ten minutes.

8. The method of Claim 1, wherein the commands include scene graph display commands associated with a graphical display.

5 9. The method of Claim 1, wherein the commands include two-dimensional display commands associated with a scene graph and associated with a graphical display.

10. The method of Claim 1, wherein the commands are associated with an air traffic control (ATC) display.

10 11. The method of Claim 1, wherein the recording the first set of commands and the recording the one or more additional set of commands are adapted to store the first set of commands and the one or more additional sets of commands in an electronic solid-state memory.

15 12. The method of Claim 1, wherein the storing the first and second dynamic snapshots and the storing the one or more additional sets of commands are adapted to store the first and second dynamic snapshots and the one or more additional sets of commands in a non-volatile memory.

20 13. The method of Claim 12, wherein the non-volatile memory comprises at least one of an electronic non-volatile memory and a tape recorder.

14. The method of Claim 1, further including:
receiving a time of interest, wherein the time of interest is between the first time and the second time;

5 retrieving the first dynamic snapshot;
retrieving selected ones of the one or more additional sets of commands, wherein the selected ones of the one or more additional sets of commands include commands recorded at or before the time of interest;

10 appending the selected ones of the one or more sets of commands to the first dynamic snapshot to provide an intermediate dynamic snapshot associated with the time of interest; and
interpreting the commands associated with the intermediate dynamic snapshot.

15. The method of Claim 14, further including eliminating selected ones of overriding redundant, and superfluous commands from within the intermediate dynamic snapshot.

16. The method of Claim 14, wherein the commands include display commands associated with a scene graph and associated with a graphical display, wherein the interpreting the commands includes generating the graphical display.

20 17. The method of Claim 14, wherein the commands include two-dimensional display commands associated with a scene graph and associated with a graphical display, wherein the interpreting the commands includes generating the graphical display.

25 18. The method of Claim 14, wherein the commands are associated with an air traffic control (ATC) display, wherein the interpreting the commands includes generating the ATC display.

19. The method of Claim 1, further including:

receiving a time of interest, wherein the time of interest is between the first time and the second time;

5 retrieving the first dynamic snapshot;

interpreting the first dynamic snapshot

retrieving selected ones of the one or more additional sets of commands, wherein the selected ones of the one or more additional sets of commands include commands recorded at or before the time of interest; and

10 interpreting the selected ones of the one or more additional sets of display commands.

20. The method of Claim 19, wherein the commands include display commands associated with a scene graph and associated with a graphical display, wherein the interpreting the first dynamic snapshot includes generating the graphical display, and wherein the interpreting the
15 selected ones of the one or more additional sets of display commands includes updating the graphical display.

21. The method of Claim 19, wherein the display commands include two-dimensional display commands associated with a scene graph and associated with a graphical display,
20 wherein the interpreting the first dynamic snapshot includes generating the graphical display, and wherein the interpreting the selected ones of the one or more additional sets of display commands includes updating the graphical display.

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23. The method of Claim 20, wherein the commands are associated with an air traffic
25 control (ATC) display, wherein the interpreting the first dynamic snapshot includes generating the ATC display, and wherein the interpreting the selected ones of the one or more additional sets of display commands includes updating the ATC display.

24. A computer program medium having computer readable code thereon for storing commands, the medium comprising:

instructions for recording a first set of commands to a command queue to provide a first dynamic snapshot, wherein the first dynamic snapshot corresponds to a set of commands associated with a first system state;

instructions for storing the first dynamic snapshot at a first time;

instructions for recording one or more additional sets of commands to the command queue;

instructions for storing the one or more additional sets of commands, wherein storing a first one of the one or more additional sets of commands is spaced in time from storing a second one of the one or more additional sets of commands by a first storage interval;

instructions for eliminating selected ones of overriding redundant, and superfluous commands from the command queue to provide a second dynamic snapshot, wherein the second dynamic snapshot corresponds to a set of commands associated with a second system state;

instructions for storing the second dynamic snapshot at a second time as a second dynamic snapshot, wherein a difference between the first time and the second time corresponds to a second storage interval.

25. The computer program medium of Claim 24, wherein the commands include display commands associated with a scene graph and associated with a graphical display.

26. The computer program medium of Claim 24, wherein the commands include two-dimensional display commands associated with a scene graph and associated with a graphical display.

27. The computer program medium of Claim 24, wherein the commands are associated with an air traffic control (ATC) display.

28. The computer program medium of Claim 24, wherein the recording the first set of commands and the recording the one or more additional set of commands are adapted to store the first set of commands and the one or more additional sets of commands in an electronic solid-state memory.

29. The computer program medium of Claim 24, wherein the storing the first and second dynamic snapshots and the storing the one or more additional sets of commands are adapted to store the first and second dynamic snapshots and the one or more additional sets of commands in a non-volatile memory.

30. The computer program medium of Claim 29, wherein the non-volatile memory comprises at least one of an electronic non-volatile memory and a tape recorder.

31. The computer program medium of Claim 24, further including:
instructions for receiving a time of interest, wherein the time of interest is between the first time and the second time;
instructions for retrieving the first dynamic snapshot;
instructions for retrieving selected ones of the one or more additional sets of commands, wherein the selected ones of the one or more additional sets of commands include commands recorded at or before the time of interest;
instructions for appending the selected ones of the one or more sets of commands to the first dynamic snapshot to provide an intermediate dynamic snapshot associated with the time of interest; and
instructions for interpreting the commands associated with the intermediate dynamic snapshot.

32. The computer program medium of Claim 31, further including instructions for eliminating selected ones of overriding redundant, and superfluous commands from within the intermediate dynamic snapshot.

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33. The computer program medium of Claim 31, wherein the commands include display commands associated with a scene graph and associated with a graphical display, wherein the interpreting the commands includes generating the graphical display.

10 34. The computer program medium of Claim 31, wherein the commands include two-dimensional display commands associated with a scene graph and associated with a graphical display, wherein the interpreting the commands includes generating the graphical display.

15 35. The computer program medium of Claim 31, wherein the commands are associated with an air traffic control (ATC) display, , wherein the interpreting the commands includes generating the ATC display.

36. The computer program medium of Claim 24, further including:
instructions for receiving a time of interest, wherein the time of interest is between the
20 first time and the second time;
instructions for retrieving the first dynamic snapshot;
instructions for interpreting the first dynamic snapshot
instructions for retrieving selected ones of the one or more additional sets of commands,
wherein the selected ones of the one or more additional sets of commands include commands
25 recorded at or before the time of interest; and
instructions for interpreting the selected ones of the one or more additional sets of
display commands.

37. The computer program medium of Claim 36, wherein the display commands include two-dimensional display commands associated with a scene graph and associated with a graphical display, wherein the instructions for interpreting the first dynamic snapshot include instructions for generating the graphical display, and wherein the instructions for interpreting the selected ones of the one or more additional sets of display commands include instructions for updating the graphical display.

38. A system for storing commands, comprising:

a recording proxy adapted to intercept the commands;
a dynamic snapshot generator coupled to the recording proxy for providing dynamic snapshots, wherein each dynamic snapshot corresponds to a respective sets of commands and each set of commands is associated with a system state;

a command interface coupled to the recording proxy for providing commands;

a storage module coupled to the command interface and to the dynamic snapshot generator, for storing the commands and for storing the dynamic snapshots.

39. The system of Claim 38, wherein the commands include display commands associated with a scene graph and associated with a graphical display.

40. The system of Claim 38, wherein the commands include two-dimensional display commands associated with a scene graph and associated with a graphical display.

41. The system of Claim 38, wherein the commands are associated with an air traffic control (ATC) display.

42. The system of Claim 38, wherein the dynamic snapshot generator includes:
a command queue having:

- 5 a command stack portion for recording commands; and
- a dynamic snapshot portion for recording commands associated with a system state, and
- a processor adapted to combine the commands in the command queue to eliminate selected ones of overriding, redundant, and superfluous commands in the command queue.

10 43. The system of Claim 42, wherein the storage module is adapted to store commands associated with the command stack portion and to store commands associated with the dynamic snapshot portion.

15 44. The system of Claim 42, wherein the storage module is adapted to provide display commands associated with the command stack portion and the display commands associated with the dynamic snapshot portion for generating a graphical display.